

Tabulators.	A.	B.	C.	D.
	<i>Hours.</i>	<i>Hours.</i>	<i>Hours.</i>	<i>Hours.</i>
Campbell-Stokes Burning Recorder.....	1,500	1,500	1,522
Jordan Photographic Recorder.....	1,363	1,412	1,416	1,454

This shows a "personal error" in the tabulation of results from the burning recorder of only about 1 per cent, while for results from the photographic recorder the variation is from about 3 per cent to 7 per cent. This "personal error" is a refinement that has received little or no attention in the compilation of records from the Weather Bureau photographic recorders, but is shown by Mr. Curtis' experiments to be a very important matter. The Weather Bureau formerly kept a record for Washington by the burning recorder; the data has not yet been compiled but it would seem capable of being measured with a fair degree of accuracy.

As there may be differences of opinion and practice among Weather Bureau observers as to just how much of the photographic trace should be measured and tabulated, we note that Mr. James B. Jordan, in commenting upon this subject, states that it is wrong to ignore any trace, no matter how faint or indistinct. That the photographic recorder can not record too much sunshine, as the faintest trace is necessarily due to the sun's rays, and, as the washing reduces the faint traces especially, it is all the more desirable to tabulate everything.

Mr. Gaster stated that in England the photographic recorder was introduced because the burning recorder did not record the faintest sunshine, and that originally the traces

from the photographic instrument were measured before being washed. The result was considered so large that comparison between records was impossible, and therefore washing was resorted to to make the records of the two instruments uniform. By using the better grades of blue-print paper it is not believed that the loss of records due to washing can be appreciable; and, with from 15 to 31 days record on each sheet, as obtained from the Weather Bureau photographic instrument, it is quite desirable to have the traces made permanent before compiling the data therefrom.

There was considerable discussion as to the deterioration of the glass used in the spheres of the burning recorders, due to chemical action, but this is a question that has not thus far been necessary to consider here, as there can be little or no effect of this kind that will impair the usefulness of the thermometric sunshine recorders used by the Weather Bureau.

Mr. Curtis' paper discusses at some length several questions, viz: How much of the trace on the sunshine records should be measured; the proper photographic chemicals; the effects of age on plates; and the effect of washing to fix the record. It gives 12-year records for the month of May at seven observatories, and shows the results of tabulations and the effect of personal equation.

[NOTE.—As the photographic recorder is apparently open to an uncertainty of 5 per cent, it is very desirable that Mr. Maring's combined photo and thermo recorder be put in operation at a few stations, in order to determine the degree of agreement between the two distinct and simultaneous records of this new type of instrument.—C. A.]

NOTES BY THE EDITOR.

THE KITE IN FRANCE.

At the meeting of the Meteorological Society of France, November 4, 1897, under the presidency of Professor Mascart, M. Teisserenc de Bort gave an account of the first results of the work that is being done by him at his "Observatory for Dynamic Meteorology" at Trappes, near Paris.

Since October 1, 1897, a self-register for pressure and temperature has been sent up at the Observatory for Dynamic Meteorology whenever the wind was strong enough to raise the kites. These ascensions became rather rare because of the season of calms which began about the middle of the month; hitherto they have been made by means of hexagonal kites furnished with tails and whose framework is made of aluminum. Teisserenc de Bort remarks that this style of kite is certainly inferior in efficiency to the American models, which will be adopted by him in the near future; but it is far easier to construct and, in its present perfected state, it possesses great stability; as to this latter point he finds that at small altitudes, 200 or 300 meters, in the great majority of cases, the displacement of the kite sidewise within a few seconds does not exceed its own apparent diameter. This result has been attained by changing the form of the tail, which is constructed of two rows of small bunches of paper, which are kept at a constant distance apart, about 35 centimeters (14 inches), by small bars of wood or aluminum. A cloth cone of about 25 centimeters (10 inches) in diameter at the large end forms the terminus of the tail; the whole reminds one of a clock pendulum of about 6 meters long. The whole tail weighs from 500 to 800 grams, according to the size of the kite.

The kite itself has about 3.2 square meters of surface with a weight of 1,700 grams, or 2 square meters with a weight of 1,200 grams. The presence of the tail increases the weight of the kite, and especially introduces a horizontal pull which

depends upon the force of the wind; consequently, the ratio of the normal pressure of the kite to the horizontal pull is less favorable than in kites without tails, which latter, therefore, rise at angles greater than 45° in place of the 35° that ordinarily obtains in the case of the kites at Trappes. But one is able to utilize very nearly the same proportion of string as in the American kites and, thus, one can with 1,000 meters of string attain a height superior to 500 meters, because the curve taken by the string is much flatter. On the other hand, the tension being greater [when a tail is used] there is a greater chance of breaking the string.

M. Teisserenc de Bort mentioned some of the results obtained in his first ascensions, viz: The decrease of temperature with altitude varies very appreciably with the time of day; in the afternoon the rate of diminution attains 1° C., for 120 meters; on the contrary, toward sunset, the temperature in the layers near the soil changes very little during the first 200 or 300 meters. The maximum altitude, 1,180 meters, was reached on November 2, 1897; this altitude was determined by triangulation.

Following the above communication the veteran meteorologist, Renou, expressed the desirability of a further development of these interesting researches. The President, Professor Mascart, took this occasion to congratulate Teisserenc de Bort upon the interesting works that he had undertaken at his observatory at Trappes. It is desirable that these observations, by means of kites, should be made as regularly and as continuously as possible, and should be supplemented by the use of a captive balloon on calm days, so as to obtain data as to atmospheric variations in the vertical above us for all kinds of weather. He urged Teisserenc de Bort to seek some practical method of establishing a captive balloon at a certain definite height, and insisted upon the fact that if a definite program, perfected in all its details, were at hand one would certainly find the financial means necessary for

its execution. In this respect Renou agreed with the words of Mascart.

M. Teisserenc de Bort thanked the President, Mascart, for the interest that he has shown, which would be a great encouragement to himself and his collaborators; he added that he already had a small captive balloon of about 40 cubic meters capacity, intended for preliminary experiments, but the cable has not yet been received; but in the course of last spring he had, by the aid of small models made of gold-beater's skin, made a series of researches on the best form for these aerostats, and hopes that he may, with patience, finally arrive at a practical solution.

LOCAL CLIMATIC CHANGES.

A correspondent in Northfield, Mass., desires our opinion on the question: "Were the winters of fifty or seventy-five years ago much colder, or were the snowfalls deeper than at present? The opinion is widely held that the winters were colder and the snowfalls deeper, but I can find nothing to warrant the belief except that in the first part of the century a much larger percentage of the population lived in the hill towns or in the interior, which are both colder than the valleys or the coast towns."

On the general question as to appreciable changes in climate the Editor's opinion is that there has been no such change in any respect whatever so far as meteorology proper is concerned. If we divide our records of the weather recorded in North America since the days of Columbus into two periods, viz, before and after the year 1800, we shall find that every peculiarity, such as remarkable storms, winds, rains, floods, frosts, etc., recorded in the current century can be matched by a corresponding remarkable event before the year 1800. The popular impressions alluded to by our correspondent result almost entirely from the imperfections of our records and especially of our memories. There is a large class of persons whose habits of thought are so crude that when they experience any very remarkable weather they jump to the conclusion that the climate has changed, forgetting that they themselves have had such a limited personal experience that they are not fair judges of the weather over the whole country or of the climate of a century.

Our correspondent seems to suggest that a certain change in the habits of the people, such as the removal from the interior to the coast, or from forests to prairies, or from country to city, or vice versa, will partly account for widespread errors in respect to climate. The suggestion is excellent, but the Editor would be inclined to interpret the phenomenon somewhat differently. The general movement of the population in the past century has been from the Atlantic States westward, and from the country to the city, or quite opposite to the movement suggested by our correspondent. In fact, we find no real agreement in the so-called popular traditions with regard to the weather. We have met with quite as many persons who think the winters are more severe as with those who think the winters are less severe than formerly. Everything seems to depend upon how and where the "oldest inhabitant" lived when he was a boy as compared with his present condition. If he moved from a farm on a windy hilltop in the country down to a cosy house in the village, the climate seemed to him to have improved. If he moved from the milder climates on the coast in his youth to the severer climates in the interior he was, as a boy, struck with the great change, and the impression still remains with him that those winters were severer than now. If he has lived continuously in a large city like New York, where the growth of tall houses, the increased smoke, and diminished sunshine have completely changed the climate, and where these combined with the changes in the mode of living, especially the abolition of

the open wood fire, have rendered the human system vastly more sensitive he finds that the inequalities of climate are greater than formerly.

From a hygienic point of view "the climate" includes everything that affects the health and comfort of the body. The meteorological climate that agrees perfectly with one person may be entirely too severe for another. Our remembrance of our physical sensations is not a safe criterion when judging of climate. Our remembrance of an occasional storm or winter is not a safe guide in comparing the past with the present. Our records of deep snows are too fragmentary to give anything more than a general conviction that there has been no material change in the snowfall. Our records of extreme low temperatures are liable to be in error several degrees by the ancient use of very imperfect thermometers and are almost certain to be exaggerated if the thermometers were placed in valleys or lowlands where cold air settles on still, clear nights, so that we must use great caution in interpreting these records; differences of 5, 10, and even 20 degrees have occurred between the minimum temperatures recorded by Weather Bureau and voluntary observers located within a few miles of each, owing to the combination of these two sources of error.

Remarkable rains and snows are usually quite local phenomena; there have been several remarkable cases of this nature in certain portions of New England and the Middle Atlantic States within the past ten years. Similar remarkable cases occurred in other portions of these States fifty years ago and equally remarkable cases occurred in still other portions just before 1800. If there has been any change in the climate of Northfield, Mass., it is because it lay within some one of these regions of extraordinary rain or snow on one occasion and not on another. Such a change of climate at one spot is no criterion by which to judge of changes at other places 100 miles away. The average climate of New England so far as the weather is concerned has not appreciably changed since the days when her oldest forest trees were young saplings, and that carries us back nearly five hundred years.

THE CELEBRATION OF THE SEMICENTENNIAL OF THE ROYAL PRUSSIAN METEOROLOGICAL INSTITUTION.

One of the evidences of the youthfulness of meteorology lies in the fact that so few institutions established to promote this branch of science have come down to us from ancient date. To be sure we have the famous Tower of the Winds, established in classical times in Athens, and the valuable meteorological records kept by Tycho Brahe at Uraniborg in his royal observatory on the island of Huenä, in the Kingdom of Denmark. But these observatories have long since become obsolete, and all existing institutions for the promotion of meteorology, whether they are individual observatories or extensive weather bureaus, are of recent date. One of the early official recognitions of meteorology, as a matter of observation and record, was that made by the United States, when on April 29, 1817, Josiah Meigs, as Surveyor-General of the United States, asked for monthly records from the surveyors or registers of the Land Office scattered throughout what was then the western portion of our territory.

In the next year, 1818, Surgeon-General Joseph Lovell ordered the surgeons at military posts to keep regular records of the weather, in accordance with a suggestion made by Hospital-Surgeon Dr. Benjamin Waterhouse, and in continuation of a military order of May 2, 1814, which made it the duty of hospital surgeons to keep a diary of the weather. From that date until now the records of the Surgeon-General's Office have been maintained uninterruptedly and published in several successive meteorological registers.